IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	§	
MAUFER et al.	§	Confirmation No.: 3473
	§	
Serial No.: 10/603,792	§	Group Art Unit: 2619
	§	
Filed: June 24, 2003	§	Examiner: Moore Jr., Michael J.
	§	
For: PACKET PROCESSING	§	
WITH RE-INSERTION	§	
INTO NETWORK	§	
INTERFACE CIRCUITRY	§	

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Commissioner for Patents ·
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Alexandria, VA 22313-1450

RESPONSE TO FINAL OFFICE ACTION DATED DECEMBER 20, 2007

Dear Sir:

In response to the Final Office Action dated December 20, 2007 having a shortened statutory period for response set to expire on March 20, 2008, please enter this response and reconsider the claims pending in the application for the reasons discussed below. Although Applicant believes that no additional fees are due in connection with this response, the Commissioner is hereby authorized to charge Counsel's Deposit Account No. 20-0782/NVDA/P000804/JCC for any fees, including extension of time fees or excess claim fees, required to make this response timely and acceptable to the Office.

Amendments to the Specification begin on page 2 of this paper.
Amendments to the Claims are reflected in the listing of claims which begins on page 3 of this paper. **Remarks** begin on page 11 of this paper.

IN THE SPECIFICATION:

Please replace paragraph [00150] with the following amended paragraph:

[00150]   One or more aspects of the invention are implemented as program products for use with computer system 1000. Program(s) of the program product defines functions of embodiments in accordance with one or more aspects of the invention and can be contained on a variety of signal-bearing media, such as computer-readable media having code, which include, but are not limited to: (i) information permanently stored on non-writable storage media (*e.g.*, read-only memory devices within a computer such as CD-ROM or DVD-RAM disks readable by a CD-ROM drive or a DVD drive); or (ii) alterable information stored on writable storage media (*e.g.*, floppy disks within a diskette drive or hard-disk drive or read/writable CD or read/writable DVD). ~~; or (iii) information conveyed to a computer by a communications medium, such as through a computer or telephone network, including wireless communications. The latter embodiment specifically includes information downloaded from the Internet and other networks.~~ Such signal-bearing media, when carrying computer-readable instructions that direct functions of one or more aspects of the invention represent embodiments of the invention.

IN THE CLAIMS:

The following listing of claims will replace all prior listings of claims in the application.

1. (Canceled):

2. (Canceled):

3. (Currently Amended): A method for <u>assembling a plurality of packet fragments into a packet</u> ~~handling a burst of packets sent to network interface circuitry~~, <u>the method</u> comprising:

    <u>receiving a first packet fragment associated with a first packet;</u>

    <u>determining that the first packet fragment has a valid checksum;</u>

    <u>storing the first packet fragment in a reserved buffer space in memory corresponding to the first packet;</u>

    <u>starting a timer to measure a time period;</u>

    <u>sorting the packet fragments in the reserved buffer space based on a fragment number associated with each packet fragment; and</u>

    <u>determining, at a predetermined time interval, whether any packet fragment associated with the first packet is missing.</u>

    ~~buffering the packets in memory accessible by the network interface circuitry;~~

    ~~incrementing a counter of the network interface circuitry for each of the packets buffered;~~

    ~~checking for a connection table entry for the packets buffered;~~

    ~~responsive to non-existence of the connection table entry, sending the packets to network interface software for preparing the packets for the network interface circuitry, the network interface software for:~~

        ~~generating an address resolution table (ART) index for an address resolution table entry that stores a media access control (MAC) address and MAC layer attributes;~~

        ~~building the connection table entry, including the ART index;~~

at least partially processing the packets;

sending the packets as processed to the network interface circuitry;

forwarding the packets from the network interface circuitry;

correspondingly clearing the buffer of the packets responsive to the packets forwarded; and

correspondingly decrementing the counter for each of the packets cleared from the buffer.

4. (Currently Amended):   The method, according to claim 3, wherein at least one packet fragment is missing at the end of the time period, and further comprising the step of clearing the reserved buffer space corresponding to the first packet the packets are buffered in local memory of the network interface circuitry.

5. (Currently Amended):   The method, according to claim 3 [[4]], wherein the packets are User Datagram Protocol formatted packets no packet fragments are missing at the end of the time period, and further comprising the steps of:

combining each of the packet fragments in the reserved buffer space to generate the first packet;

buffering the first packet in memory accessible by the network interface circuitry;

incrementing a counter of the network interface circuitry;

checking for a connection table entry for the first packet;

responsive to non-existence of the connection table entry, sending the first packet to network interface software for preparing the first packet for the network interface circuitry, the network interface software configured to:

generate an address resolution table (ART) index for an address resolution table entry that stores a media access control (MAC) address and MAC layer attributes,

build the connection table entry, including the ART index,

at least partially process the first packet, and

send the first packet as processed to the network interface circuitry;

forwarding the first packet from the network interface circuitry;

clearing the buffer of the first packet responsive to forwarding the first packet; and

decrementing the counter.

6. (Currently Amended):   The method, according to claim 5 [[4]], wherein the first packet is a packets are Voice Over Internet Protocol formatted packet or a User Datagram Protocol formatted packet packets.

7. (Currently Amended):   The method, according to claim 5 [[3]], further comprising the step of generating a total count signal from the buffer, wherein the total count signal indicates to the network interface circuitry whether all the packets sent to the network interface software for processing have been at least partially processed.

8. (Currently Amended):   The method, according to claim 5 [[3]], further comprising the step of setting a do not use flag for the connection table entry, wherein the packets subsequent to an initial received packet for a connection and to creation of the connection table entry are sent to the network interface software for processing responsive to the do not use flag being set.

9. (Currently Amended):   The method, according to claim 5 [[3]], wherein the first packet is packets are completely processed by the network interface software.

10. (Currently Amended): The method, according to claim 5 [[3]], further comprising the step of completing the processing of the first packet packets with the network interface circuitry.

11. (Currently Amended): A computer readable medium storing instructions for causing a network interface to assemble a plurality of packet fragments into a packet, by performing the steps of: An apparatus for handling a burst of packets sent to network interface circuitry, comprising:

receiving a first packet fragment associated with a first packet;

determining that the first packet fragment has a valid checksum;

storing the first packet fragment in a reserved buffer space in memory corresponding to the first packet;

starting a timer to measure a time period;

sorting the packet fragments in the reserved buffer space based on a fragment number associated with each packet fragment; and

determining, at a predetermined time interval, whether any packet fragment associated with the first packet is missing.

~~means for buffering the packets in memory accessible by the network interface circuitry;~~

~~means for incrementing a counter of the network interface circuitry for each of the packets buffered;~~

~~means for checking for a connection table entry for the packets buffered;~~

~~means for sending the packets to network interface software for preparation for the network interface circuitry responsive to one of non-existence of the connection table entry and a do not use flag, the network interface software including:~~

~~means for generating an address resolution table (ART) index for an address resolution table entry that stores a media access control (MAC) address and MAC layer attributes;~~

~~means for building the connection table entry, including the ART index;~~

~~means for at least partially processing the packets in sequence; and~~

~~means for sending the packets as processed to the network interface circuitry;~~

~~means for forwarding the packets as at least partially processed from the network interface circuitry;~~

~~means for clearing the buffer of the packets respectively responsive to the packets forwarded; and~~

~~means for decrementing the counter respectively for each of the packets cleared from the buffer.~~

12. (Currently Amended): The <u>computer readable medium</u> <s>apparatus</s>, according to claim 11, wherein <u>at least one packet fragment is missing at the end of the time period, and further comprising the step of clearing the reserved buffer space corresponding to the first packet</u> <s>the memory is local memory of the network interface circuitry</s>.

13. (Currently Amended): The <u>computer readable medium</u> <s>apparatus</s>, according to claim 11, wherein <u>no packet fragments are missing at the end of the time period, and further comprising the steps of:</u> <s>the counter is coupled to the memory</s>.

<u>combining each of the packet fragments in the reserved buffer space to generate the first packet;</u>

<u>buffering the first packet in memory accessible by the network interface circuitry;</u>

<u>incrementing a counter of the network interface circuitry;</u>

<u>checking for a connection table entry for the first packet;</u>

<u>responsive to non-existence of the connection table entry, sending the first packet to network interface software for preparing the first packet for the network interface circuitry, the network interface software configured to:</u>

<u>generate an address resolution table (ART) index for an address resolution table entry that stores a media access control (MAC) address and MAC layer attributes,</u>

<u>build the connection table entry, including the ART index,</u>

<u>at least partially process the first packet, and</u>

<u>send the first packet as processed to the network interface circuitry;</u>

<u>forwarding the first packet from the network interface circuitry;</u>

<u>clearing the buffer of the first packet responsive to forwarding the first packet; and</u>

<u>decrementing the counter.</u>

14. (Currently Amended): The <u>computer readable medium</u> <s>apparatus</s>, according to claim <u>13</u> [[11]], further comprising <u>the step of</u> <s>means for</s> generating a total count signal from the buffer, wherein the total count signal indicates to the network interface circuitry

whether all the packets sent to the network interface software <u>for processing have been</u> <u>at least partially processed</u> ~~have cycled out~~.

15. (Currently Amended): <u>The computer readable medium, according to claim 13,</u> <u>wherein the first packet is a Voice Over Internet Protocol formatted packet or a User</u> <u>Datagram Protocol formatted packet.</u> ~~A computer readable medium storing instructions~~ ~~for causing a network interface to handle a burst of packets by performing the steps of:~~

~~buffering packets received in memory accessible by network interface circuitry;~~

~~incrementing a counter of the network interface circuitry for each of the packets~~ ~~buffered;~~

~~checking for a connection table entry for the packets buffered;~~

~~responsive to non-existence of the connection table entry, sending the packets to~~ ~~network interface software for preparing the packets for the network interface circuitry,~~ ~~the network interface software for:~~

~~generating an address resolution table (ART) index for an address~~ ~~resolution table entry that stores a media access control (MAC) address and~~ ~~MAC layer attributes;~~

~~building the connection table entry, including the ART index;~~

~~at least partially processing the packets; and~~

~~sending the packets as at least partially processed to the network~~ ~~interface circuitry;~~

~~forwarding the packets as at least partially processed from the network interface~~ ~~circuitry;~~

~~correspondingly clearing the buffer of the packets responsive to the packets~~ ~~forwarded; and~~

~~correspondingly decrementing the counter for each of the packets cleared from~~ ~~the buffer.~~

16. (Currently Amended): The computer readable medium, according to claim <u>13</u> [[15]], further comprising <u>the step of</u> setting a do not use flag for the connection table entry,

wherein the packets obtained after creation of the connection table entry are sent to the network interface software responsive to the do not use flag being set.

17. (Currently Amended): The computer readable medium, according to claim 13 [[15]], wherein the first packet is packets are completely processed by the network interface software.

18. – 22. (Canceled):

23. (New): A system for assembling a plurality of packet fragments into a packet, the system comprising:

a central processing unit;

a system memory coupled to the central processing unit; and

a network interface coupled to the system memory and the central processing unit, the network interface configured to:

receive a first packet fragment associated with a first packet,

determine that the first packet fragment has a valid checksum,

store the first packet fragment in a reserved buffer space in a network interface local memory corresponding to the first packet,

start a timer to measure a time period,

sort the packet fragments in the reserved buffer space based on a fragment number associated with each packet fragment, and

determine, at a predetermined time interval, whether any packet fragment associated with the first packet is missing.

24. (New): The system, according to claim 23, wherein at least one packet fragment is missing at the end of the time period, and the network interface further configured to clear the reserved buffer space corresponding to the first packet.

25. (New): The system, according to claim 23, wherein no packet fragments are missing at the end of the time period, and the network interface further configured to:

combine each of the packet fragments in the reserved buffer space to generate the first packet;

buffer the first packet in the system memory accessible by network interface circuitry;

increment a counter of the network interface circuitry;

check for a connection table entry for the first packet;

responsive to non-existence of the connection table entry, send the first packet to network interface software for preparing the first packet for the network interface circuitry, the network interface software configured to:

generate an address resolution table (ART) index for an address resolution table entry that stores a media access control (MAC) address and MAC layer attributes,

build the connection table entry, including the ART index,

at least partially process the first packet, and

send the first packet as processed to the network interface circuitry;

forward the first packet from the network interface circuitry;

clear the buffer of the first packet responsive to forwarding the first packet; and

decrement the counter.

26. (New):   The system, according to claim 25, wherein the first packet is a Voice Over Internet Protocol formatted packet or a User Datagram Protocol formatted packet.

27. (New):   The system, according to claim 25, wherein the network interface is further configured to generate a total count signal from the buffer, wherein the total count signal indicates to the network interface circuitry whether all the packets sent to the network interface software for processing have been at least partially processed.

REMARKS

The following is intended as a full and complete response to the Final Office Action dated December 20, 2007, having a shortened statutory period for response set to expire on March 20, 2008. Claims 3-22 were examined. Claims 15-17 are rejected under 35 U.S.C. §101 as directed to non-statutory subject matter. Claims 3, 4, and 7-22 are rejected under 35 U.S.C. §103(a) as being unpatentable over Robotham (U.S. 6,775,293) in view of Natanson (U.S. 6,611,525). Claim 5 is rejected under 35 U.S.C. §103(a) as being unpatentable over Robotham and Natanson in further view of Spinney (U.S. 6,426,943). Claim 6 is rejected under 35 U.S.C. §103(a) as being unpatentable over Robotham and Natanson in further view of Wei (U.S. 6,560,196).

In response, claims 3-17 are amended, claims 18-22 are canceled, and new claims 23-27 are added.

Rejections under §101

Claims 15-17 are rejected under 35 U.S.C. §101 as directed to non-statutory subject matter. Per the Examiner's suggestion, paragraph [00150] of the present application is being amended to remove the reference to "information conveyed to a computer by a communication medium" from the definition of a "computer readable medium." Applicants submit that the change sufficiently addresses the Examiner's concern and, therefore, request that the §101 rejections of the claims be withdrawn.

Rejections under §103(a)

Claim 3 is amended to recite the limitations of receiving a first packet fragment associated with a first packet, determining that the first packet fragment has a valid checksum, and storing the first packet fragment in a reserved buffer space in memory corresponding to the first packet. Also, claim 3 is amended to recite the further limitations of starting a timer to measure a time period, sorting the packet fragments in the reserved buffer space based on a fragment number associated with each packet fragment, and determining whether any packet fragment associated with the first packet is missing. Support for these amendments may be found at Figures 16-17 and paragraphs [00154] to [00162] of the present application.

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None of the cited references teaches or suggests preparing a plurality of packet fragments to be assembled into a single packet, as recited in amended claim 3. In fact, none of the cited references discloses a technique of handling the case of packet fragments. The background section of the present application describes the problem with conventional systems, namely that packet "fragments are summarily processed by dropping them" (paragraph [0013]), which causes data loss. In contrast, amended claim 3 recites limitations that assemble packet fragments into a packet to solve the problem discussed in the background section of the present application. The cited references teach nothing more than the systems and methods discussed in the background of the present application. For these reasons, amended claim 3 is patentable over the cited references.
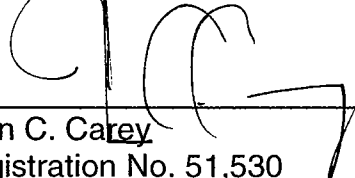
Additionally, claims 4 and 5 are amended to recite limitations that depend on whether fragments are missing at the end of the time period. More specifically, amended claim 4 recites the limitations of clearing the reserved buffer space when at least one packet fragment is missing at the end of the time period. As described at paragraphs [00154] to [00162] of the present application, clearing the reserved buffer space may be advantageous in limited-memory systems. As set forth above, none of the cited references teaches or suggests handling the case of packet fragments, let alone clearing a buffer if at least one packet fragment is missing at the end of the time period, as recited in amended claim 4. For these reasons, these claims are patentable over the cited references.

As the foregoing illustrates, the cited references each fail to teach or suggest the limitations of amended claim 3 that relate to packet fragments. Therefore, no combination of the cited references can render claim 3 obvious. For these reasons, Applicant respectfully submits that claim 3 is patentable over the cited references and requests allowance of the claim. Independent claims 11 and 23 recite limitations similar to those of claim 3. Therefore, these claims are in condition for allowance for at least the same reasons as claim 3. Claims 4-10, 12-17, and 24-27, depend, respectively, from allowable claims 3, 11, and 23 and are therefore also in condition for allowance.

CONCLUSION

Based on the above remarks, Applicants believe that they have overcome all of the rejections set forth in the Final Office Action mailed on December 20, 2007, having a shortened statutory period for response set to expire on March 20, 2008, and that the pending claims are in condition for allowance. If the Examiner has any questions, please contact the Applicant's undersigned representative at the number provided below.

Respectfully submitted,

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